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☐ 1. Document ID: US 20010001234 A1

L14: Entry 1 of 5 File: PGPB May 17, 2001

PGPUB-DOCUMENT-NUMBER: 20010001234
PGPUB-FILING-TYPE: new-utility
DOCUMENT-IDENTIFIER: US 20010001234 A1

TITLE: Adaptive console for augmenting wireless capability in security systems

PUBLICATION-DATE: May 17, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Addy, Kenneth L.	Massapequa	NY	US	
Linford, Karl	Massapequa	NY	US	

US-CL-CURRENT: 340/531; 340/533, 340/534, 340/539.1, 340/540

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 2. Document ID: US 6445291 B1

L14: Entry 2 of 5 File: USPT Sep 3, 2002

US-PAT-NO: 6445291
DOCUMENT-IDENTIFIER: US 6445291 B1

TITLE: Adaptive console for augmenting wireless capability in security systems

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

☐ 3. Document ID: US 6285868 B1

L14: Entry 3 of 5 File: USPT Sep 4, 2001

US-PAT-NO: 6285868
DOCUMENT-IDENTIFIER: US 6285868 B1

TITLE: Wireless communications application specific enabling method and apparatus

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

☐ 4. Document ID: US 6243010 B1

L14: Entry 4 of 5 File: USPT Jun 5, 2001

US-PAT-NO: 6243010
DOCUMENT-IDENTIFIER: US 6243010 B1

TITLE: Adaptive console for augmenting wireless capability in security systems

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

☐ 5. Document ID: US 5594740 A

L14: Entry 5 of 5 File: USPT Jan 14, 1997

US-PAT-NO: 5594740
DOCUMENT-IDENTIFIER: US 5594740 A

TITLE: Wireless communications application specific enabling method and apparatus

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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Previous Page Next Page Go to Doc#

L14: Entry 1 of 5 File: PGPB May 17, 2001

DOCUMENT-IDENTIFIER: US 20010001234 A1
TITLE: Adaptive console for augmenting wireless capability in security systems

Application Filing Date:
20010111

Summary of Invention Paragraph:
2. FIG. 1 illustrates a typical wired security system 10 of the prior art comprising a central control unit 12, a central transceiver 14, a console display/keypad 18, a plurality of remote sensors 20 and local sensors 22, a telephone dialer 24 and a siren 26. The remote sensors 20 are hard-wired to the central transceiver 14, which communicates with the central control unit 12 via a system bus 28. The system bus 28 also links the central control unit 12 to the console display/keypad 18. The central control unit 12 is connected to the telephone dialer 24 and the siren 26 via an auxiliary local bus 30. The central control unit is also hardwired to the local sensors 22. Despite a lack of wireless capability (i.e., wireless communication between components, especially between the remote sensors 20 and the central control unit 12), this type of wired security system 10 prevails in a majority of commercial applications.

Summary of Invention Paragraph:
3. In contrast, a relatively recent innovation in security systems is a wireless security system 32 as illustrated in FIG. 2 in which wireless remote sensors 21 communicate with a wireless central receiver 15 in order to report their status to the central control unit 12. Wireless keys 34, which are small remote control devices, have become popular for remote arming and disarming of the wireless security system 32, as well as remote control of other devices via the wireless central receiver 15 and central control unit 12. As shown in FIG. 2, the conventional wireless security system 32 is substantially functionally the same as the wired security system 10 illustrated in FIG. 1, except that the wireless central receiver 15, an optional wireless central transmitter 17, and wireless remote sensors 21 have been substituted for their wired counterparts of FIG. 1. In addition, the wireless key 34 transmits control messages to the wireless central receiver 15. The wireless central receiver 15 transfers these control messages over the system bus 28 to the central control unit 12, which performs an appropriate action or function. Such appropriate action may involve the initiation of an alarm condition that then sounds the siren 26 and causes the telephone dialer 24 to automatically dial an appropriate number such as the police station or firehouse. Substantially any change in status of the wireless security system 32 would be displayed to the user on the console display/keypad 18.

Summary of Invention Paragraph:
5. Despite the fact that the same identification code may be emitted by more than one wireless key (as found with automobile security systems where more than one wireless key provided to the purchaser of the automobile can control the security system), this is typically not the case with the majority of wireless security systems installed in commercial businesses and residential homes. Wireless keys 34 typically have two or more buttons which, although will emit the same identification code 34 upon being depressed, will emit different radio frequency messages differentiated in one or more status bits 40. Therefore, a significant

problem is encountered in providing sufficient storage space to maintain the complete set of valid identification and status information mapped to functions for a wireless security system of any reasonable size. This problem is compounded by the fact that existing central control units 12 found in wireless security systems include only a very limited storage area for this type of information. Furthermore, in the case of wired security systems 10 without wireless capability, such as that illustrated in FIG. 1, there is understandably no such storage whatsoever. This problem is not present in conventional wired systems because such systems are not required to respond to radio frequency messages.

Summary of Invention Paragraph:
8. The spread of wireless technology in the manufacture of security systems has been delayed significantly due to consumers' preference for wired systems. This is partially due to the vast quantity of wired security systems 10, such as that illustrated in FIG. 1, already in existence and partially due to various perceived disadvantages with wireless security systems, such as the need to replace batteries, poor reception and transmission of wireless signals, etc. Thus, the user having a wired security system 10 already installed without any wireless capability is not likely to install a wireless security system, even though he might benefit from the many advantages associated with a wireless security system such as the absence of wires as well as ease of installation, maintenance and upgrade. Likewise, many installers of security systems choose not to offer wireless security systems because of their relative inexperience with such systems in addition to the disadvantages already discussed.

Summary of Invention Paragraph:
10. Many of the wireless security systems currently in use are limited in the number of identification codes 36 that can be recognized by the system. As illustrated in FIG. 2 and discussed above, the wireless key 34 is a common element in the typical wireless security system 32. The wireless key 34 may have four buttons, each initiating a different function within the wireless security system 10, such as arming/disarming of the system, opening a garage door, emergency alert and testing, via transmission of a unique radio frequency message in response to depression of a different button. For security purposes and ease of manufacture, each wireless key 34 will be designed to transmit a unique radio frequency message in response to depression of each button. Such a configuration can rapidly outpace the capacity for storage of valid identification and status information built into existing central control units 12.

Detail Description Paragraph:
27. A commercially available example of the wireless security components is provided by a 5800 series manufactured by Alarm Device Manufacturing Co., located in Syosset, N.Y. Specifically, a 5881 wireless receiver receives radio frequency messages from a 5804 wireless key and passes the complete message (in digital format) to a central control panel or unit in order to be decoded, checked for validity, and ultimately perform a pre-programmed function. In addition, bi-directional wireless keys, such as a 5804BD wireless key, transmit information to the central control unit and receive an acknowledgment back via a 5800TM central transmitter module, which transmits to a receiver contained within the 5804BD wireless key. Thus, the 5804BD bi-directional wireless key provides feedback to the user by indicating system status via lights and tones on the 5804BD enabling the following:

Detail Description Paragraph:
34. The block diagram of FIG. 4 illustrates the operation of the adaptive console 44 in greater detail. A wireless message 38 of the type illustrated in FIG. 6 is transmitted by one or more of the remote sensors 21 in the radio frequency band and is received by the wireless distributed receiver 11 by means which are well known in the art. The wireless message 38 is comprised of preamble bits 50, start bits 52, proprietary bits 54, the identification code 36, status bits 40 and CRC bits

56. In the preferred embodiment, Manchester data encoding is used to encode a data word by means well known in the art as follows; the message commences with the preamble bits 50, which are used by the wireless distributed receiver 11 to extract timing information and to indicate that the wireless message follows. The preamble 50 is followed by the start bits 52 which indicate the start of the wireless message 38; this is followed by proprietary bits 54 which are used to indicate a particular manufacturer, system code that the system maintains a proprietary rather than open standard. The identification code 36 uniquely identifies the source of a wireless message 38 received by the adaptive console 44, or the destination of the wireless message 36 transmitted by the adaptive console 44. The status bits 40 indicate various information; for example, the status of the battery and the identity of the button on the wireless key 34 that was depressed. This is followed by CRC bits 56 which are used for error checking of the wireless message 38 by means well known in the art.

Detail Description Paragraph:
35. Upon conversion of the wireless message 38 by the wireless distributed receiver 11 to a form suitable for subsequent processing, the CRC bits 56 are verified to ensure that there were no errors in transmission, and the identification code 36 and status bits 40 are verified against a set of valid identification codes and status bits stored in memory 48 as a valid identification code to valid function mapping 58. Such a mapping 58 provides not only a list of the identification codes and status bits currently recognized as valid, but also the function to be performed by the security system upon receipt of the particular identification code and status bit combination. The functions comprise arming and disarming the security system, opening a garage door, entering a test mode, sounding an emergency state, etc.

Previous Doc Next Doc Go to Doc#

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US-CL-CURRENT: 340/531; 340/533, 340/534, 340/539.1, 340/540

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2. Document ID: US 6445291 B1

L14: Entry 2 of 5 File: USPT Sep 3, 2002

US-PAT-NO: 6445291
DOCUMENT-IDENTIFIER: US 6445291 B1

TITLE: Adaptive console for augmenting wireless capability in security systems

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

3. Document ID: US 6285868 B1

L14: Entry 3 of 5 File: USPT Sep 4, 2001

US-PAT-NO: 6285868
DOCUMENT-IDENTIFIER: US 6285868 B1

TITLE: Wireless communications application specific enabling method and apparatus

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

☐ 4. Document ID: US 6243010 B1

L14: Entry 4 of 5 File: USPT Jun 5, 2001

US-PAT-NO: 6243010
DOCUMENT-IDENTIFIER: US 6243010 B1

TITLE: Adaptive console for augmenting wireless capability in security systems

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

☐ 5. Document ID: US 5594740 A

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US-PAT-NO: 5594740
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TITLE: Wireless communications application specific enabling method and apparatus

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Previous Page Next Page Go to Doc#

L14: Entry 3 of 5 File: USPT Sep 4, 2001

DOCUMENT-IDENTIFIER: US 6285868 B1
TITLE: Wireless communications application specific enabling method and apparatus

Abstract Text (1):
A method and apparatus for wireless communication on an existing wireless communication network comprising taking existing data and manipulating the data to create manipulated data. The manipulated data is then translated into an application specific message. The application specific message is applied to control and communicate with an application specific apparatus, whereby wireless communication on the existing wireless communication network is provided without causing any disruption, system overloading, or limitation on normal system communication activity.

Application Filing Date (1):
19970110

Brief Summary Text (3):
The present invention relates to systems for transmitting and receiving two-way wireless data messages. More specifically, the invention relates to wireless communications systems including cellular telephone systems, mobile radio systems, and related technology such as Cellular Digital Packet Data (CDPD), Enhanced Specialized Mobile Radio (ESMR), Motorola Integrated Radio System (MIRS), Personal Communications Systems (PCS), satellite cellular hybrid systems, Mobile Radio (ESMR) dispatch services such as RAM Mobile Data, and ARDIS.

Brief Summary Text (5):
Systems and apparatuses have been proposed enabling wireless communication based on transmitted data rather than voice. Indeed, it has been suggested and speculated that we are in the midst of a revolution more realistically comparable in magnitude to personal computing than to cellular voice based communications. But much less clear is the path this revolution may take. The expressed commitment of virtually all major providers of wireless communications for business subscribers to expanding services in data messaging practically ensures that wireless data messaging will grow rapidly in coming years. But the very diversity of the proponents of wireless data messaging suggests an industry that will be fragmented at best, or choked by dissent and destructive competition at worst. The foremost cause of said dissent and fragmentation, is the lack of multi-system and inter system data communication protocol uniformity and standardization. Another major problem is the staggering cost of upgrading existing Cellular Mobile Telephone (CMT) and Enhanced Mobile Radio (ESMR), infrastructure. If system uniformity is accomplished, the result could produce a seamless, worldwide data communications network. The network envisioned could provide application specific services such as motor vehicle fleet management, motor vehicle anti-theft and recovery, shipping container tracking, railroad system management, personnel tracking and location, home arrest, public utility system management, highway call box add-on services, remote traffic signal control, security system status reporting, and a myriad of other application specific data communication services. Further, these application specific systems can be location based by integrating Global Positioning System receivers into the architecture of specially designed communication apparatus

Brief Summary Text (7):
The present system and apparatuses of the present invention provide a unique and simple solution to solving Cellular Mobile Telephone (CMT) and Enhanced Mobile Radio (ESMR) infrastructure upgrade and cellular inter system compatibility problems, in terms of technical, logistical and operational issues which are significantly limiting the non-voice wireless data communications industry at present. The present invention also provides an economical and technically efficient means of delivering heretofore mentioned application specific services to the Enhanced Specialized Mobile Radio (ESMR) Industry (NEXTELL), the Motorola Integrated Radio System (MIRS), and other related systems. In fact, the method and apparatuses of the present invention provide the technical and logistical means of providing application specific services to any communications standard which operates on wireless networks or which depend upon a centralized control model, or operations based on operates centralized subscriber specific authentication, registration, and inter system control data channel architecture. In fact the present invention provides, for the first time, a system and apparatus which utilize and exploit control channel communication pathways for the purpose of directly sending and receiving data messages, and which directly communicates by radio link an entire Cellular Mobile Telephone (CMT) or Enhanced Mobile Radio (ESMR) network for the purpose of commercially operating heretofore mentioned applications for specific services that are directly controlled and communicated with on control channels that do not require any voice channel operations.

Brief Summary Text (13):
There is further a great need in wireless communication technology for a low cost data communications system and apparatus that efficiently and economically enable application specific services and apparatuses to be installed and utilized worldwide. The present invention provides, at a very low cost, an improved wireless communications specific enabling system which overcomes the many shortcomings of prior systems.

Brief Summary Text (16):
To achieve the foregoing objects, and in accordance with the purposes of the invention as embodied and broadly described herein a method for wireless communication on existing wireless communication networks is provided, comprising: taking existing data and manipulating said existing data to create a manipulated data; translating said manipulated data into an application specific message; and applying said application specific message to control and communicate with an application specific apparatus, whereby wireless communication on said existing wireless communication network is provided without causing disruption, system overloading, or limitation on normal system communication.

Brief Summary Text (17):
The method for wireless communication is preferably transmitted through a plurality of control channels and digital traffic channels as direct communications pathways for direct control of application specific communication apparatuses and application specific control and management apparatus.

Brief Summary Text (18):
In accordance with the present invention, there is also provided an apparatus for direct wireless communication on an existing wireless communication networks, comprising: circuitry means for taking existing data and manipulating said existing data to create a manipulated data; means for translating said manipulated data into an application specific message; and means for applying said application specific message to control and communicate with an application specific apparatus, whereby wireless communication on said existing wireless communication network is provided without causing disruption, system overloading, or limitation on normal system communication activity.

Brief Summary Text (19):

Accordingly, the present invention provides a wireless communications application specific enabling (WCASES) technology, which provides an efficient and economical means for implementing such wireless data services in applications such as; motor vehicle fleet management, motor vehicle anti-theft locating and recovery, interactive game data management, cable television data communications, shipping container tracking, railroad system management, personnel tracking and locating, home arrest, public utility system management, highway call box ad-on services, remote traffic signal control, public utility system management, security system status reporting, and many other application specific data communications, and system command and control services. The term application specific relates to; applications which are data communication specific only, which relate to; Cellular Mobile Telephone (CMT), Enhanced Specialized Mobile Radio (ESMR), Satellite Cellular Hybrid (SCH) and Low Earth Orbit (LEO) systems called "brilliant pebbles systems", that can integrate and apply the present inventions method and apparatus, which will enable the communications systems to transmit messages to an apparatus which operates as a response to direct commands sent to the apparatus, and the apparatus will perform directed tasks as a response to the commands. The apparatus also sends data messages which relate to various parameters, conditions, and responses from systems and sensors, that the application specific apparatus is connected to or interfaced with. Preferably the control and direct communication activity will all occur on control channels and digital traffic channels that are integrated with Cellular Mobile Telephone (CMT), Enhanced Mobile Radio (ESMR) and Satellite Cellular Hybrid (SCH) systems, and Low Earth Orbit (LEO) "brilliant pebbles" systems which utilize control channels and digital traffic channels that are data specific only in terms of communications protocols, and the contents of the messages are contained within radio frequency carrier wave and wave form. The present invention does not interact in any way with channels and frequencies of the communication systems that act as voice communication specific pathways.

Drawing Description Text (3):
FIG. 1 is a block diagram of a preferred wireless communications specific enabling method, network, and apparatus according to the invention

Drawing Description Text (4):
FIG. 1B shows a block diagram of a preferred wireless communications specific enabling method, network, and apparatus, according to the invention.

Drawing Description Text (5):
FIG. 2 is a flow chart illustrating the operation of transmittal of manipulated data and translated data into a wireless communications network, according to the invention.

Drawing Description Text (15):
FIG. 9 is a flow chart of the Application Specific Video Game Unit score and status data as it circulates through a wireless communication system and a cable television system, according to the invention.

Detailed Description Text (3):
In accordance with the present invention, there is provide a method for wireless communication on existing wireless communication networks, comprising: taking existing data and manipulating said data to create a manipulated data; translating said manipulated data into an application specific message; and applying said application specific message to control and communicate with an application specific apparatus, whereby wireless communication on said existing wireless communication network is provided without causing disruption, system overloading, or limitation on normal system communication activity.

Detailed Description Text (4):
There is also provided, in accordance with the present invention, an apparatus for direct wireless communication on an existing wireless communication network,

comprising: circuitry means for taking existing data and manipulating said existing data to create a manipulated data; means for translating said manipulated data into an application specific message; and means for applying said application specific message to control and communicate with an application specific apparatus, whereby wireless communication on said existing wireless communication network is provided without causing disruption, system overloading, or limitation on normal system communication activity thereby allowing data transmission without any interference or disruption with routine voice and related communications and control procedures of the wireless network.

Detailed Description Text (6):
The preferred method for wireless communication on existing wireless communication networks takes existing data and manipulates the data to create manipulated data. The data may be data providing readings of a remote monitoring device, for example, or data monitoring a game apparatus, traffic signal control apparatus, shipping container tracking apparatus, or the like. Preferably the manipulated data is transmitted through a plurality of control channels and digital traffic channels as a direct communication pathways for direct control of an application specific communications apparatus, or application specific control and management apparatus, such as those discussed above.

Detailed Description Text (7):
The present invention is applicable, adaptable, and operable with all analog and digital Cellular Mobile Telephone (CMT) systems, Enhanced Mobile Radio (ESMR) systems, and other wireless communications system that depend upon electronic operations commonly described as; centralized control, registration, authentication, anti-fraud, system management, intersystem communications, home location registers, and visitor location registers. These electronic process are important for system operational efficiency, flexibility, overall system security and user specific security. Such operational schemes traditionally include but are not limited to the following; electronic processes that perform registration routines, authentication routines, system control management, network to network communications, subscriber specific system to system roaming, anti-fraud procedures, and voice encryption. Other characteristics of aforementioned systems include; internal system maintenance and system performance analysis, base station to base station handoffs and handovers, home system to serving system handoffs and handovers, and other types electronic data control channel related communications.

Detailed Description Text (19):
The preferred method and apparatus of the present invention allows for an application-specific communications apparatus to receive an application specific message for control and communication with the application specific apparatus, for example, location and non-location data of specific service apparatuses. The location and non-location application specific communications apparatus is preferably configured and manufactured to data communications and control operations. Such operations as location specific motor vehicle tracking, motor vehicle anti-theft and recovery, shipping container tracking, personnel tracking, and other location based data communications services can be provided by configuring the location Cellular Mobile Telephone (CMT), and Enhanced Mobile Radio (ESMR) communications apparatus, in accordance with the hereinafter described specific nomenclature and design parameters to accomplish electronically the application specific communications and control processes as described.

Detailed Description Text (23):
According to another aspect of the invention, there is provided a group of central monitoring, Wireless Communications Application Specific Enabling System (WCASES), data retrieval, data decoding, data distribution, data storage, and command data control method and apparatus. The Data Reception and Distribution terminal (DRD), data Decoder terminal (DEC), Comparative Data Base terminal (CDB), and Command Data Control terminal (Command Data Control), and other interface and communications

components preferably comprise the central components of a WCASES Central Monitoring Station (CMS). Further, such nomenclature as, Regional Data Reception and Distribution terminal (RDRD), Regional Decoder terminal (RD), Regional Comparative Data Base (RCDB), and Regional Command Data Control terminal (RCDC), Master Data Reception and Distribution terminal (MDRD), Master Decoder Terminal (MDRD), and Master Command Data Control terminal (MCDC), Application Specific Data Reception and Distribution terminal (ASDRD), Application Specific Decoder terminal (ASD), and Application Specific Command Data Control terminal (ASCDC) all are designated as data retrieval, distribution, storage, and command systems which encompasses and comprise the present inventions Central Monitoring System (CMS).

Detailed Description Text (25):
The present invention is a multi-featured wireless communications application specific enabling system, which includes means for reading, analyzing, controlling and communicating through various wireless communication networks and the signalling, control channels, and through the digital traffic channel that operate within these networks. Preferred networks which may be utilized include Cellular Mobile Telephone (CMT), Enhanced Specialized Mobile Radio (ESMR) NEXTELL, Specialized Mobile (GSM), Personal Communications System (PCS), Satellite Cellular Hybrid (SCH) system. Additionally, any wireless communications system that depends upon centralized control via data control channels and digital traffic channels for the purposes of user registration, billing, internal system maintenance, internal system security, sending user information, and other related operations, is immediately usable by the present inventions apparatus and methodology. Further any wireless-communications system which utilizes separate data control channels and digital traffic channels for such aforesaid operations can be utilized and adapted for the present inventions application specific communications, operations and application specific communications apparatus.

Detailed Description Text (26):
The invention includes means for remote monitoring and calculating an objects, or person's location. For, example, a motor vehicle's location, a person's location, or other moveable objects position, direction, detect local status events, and like, and calculating a system response based on a plurality of weighted variables. From such calculated response, the system notifies the user of various status parameters of the object or person being monitored. In certain circumstances, the system may be used to notify an application specific central monitoring station via two-way data control channels and digital traffic channels to allow the central monitoring station to respond appropriately to various situations such as summoning emergency vehicles, police, private security personnel, medical personnel, and other such emergency response services. Provision of a two-way control data channel and digital traffic channel communications system also allows the Central Monitoring Station to positively verify the message which was sent by the motor vehicle, person or moveable object being monitored or located.

Detailed Description Text (27):
The preferred embodiment of the apparatus for direct wireless communication on an existing wireless communication network present includes a plurality of computer displays and computerized graphic maps which display the relative position and status of an object or person being monitored, such as a motor vehicle, person or moveable object, derived from Global Positioning System (GPS), or other vectoring, triangulating, and other relative position computing system. Other methods of establishing a location can garnered by user input or by other automatic sensors and location systems, thereby providing a highly accurate real-time tracking and status communication enabling system.

Detailed Description Text (28):
The preferred apparatus for direct wireless communication also includes an integrated location system, a communication network via data control channels, and a plurality of digital traffic channels mapping systems operably coupled to status

response systems, and application specific dispatch capability via a Master Central Monitoring Stations (MCMS), and an Application Specific Central Monitoring Stations (ASCMS). The location aspect of the present invention is especially suitable for use in fleet vehicle management, vehicle theft deterrent, stolen vehicle tracking, railroad car tracking, cargo location, and so forth. The apparatus when applied with the method of the present invention may be customized to a particular user's needs and, due to the preferred embodiment's use of the GPS and other location designation systems, coupled with the present invention's adaptability, may be installed and used virtually anywhere in the world.

Detailed Description Text (29):
A plurality of calculating and control elements are preferably fixed in a given location various. Such elements or devices can be interfaced with an unlimited number of systems and apparatus which perform very simple tasks or complex tasks. Preferably such elements control and detect electrical device voltage loads, detect and report security system status data, for use in commercial and residential buildings, control traffic signals, interfaces with roadside call boxes to provide existing data for manipulation and communications tasks such as measuring road conditions, counting vehicles that pass by, measuring local temperature, and many other related application specific functions. Other applications include collecting and reporting video game scores and other interactive data, and operate conjunctively with Direct Broadcast Satellites and cable television networks. Such fixed location elements or devices also calculate a system response based on all sorts of weighted variables, and report said variables to electronic Billboards (BBS). Such fixed location elements also respond to both existing data, manipulated data, and application specific messages and commands, and report the results of said data messages and commands to an Application Specific Central Monitoring Station (ASCMS) via data control channels and digital traffic channel that are operated by aforementioned wireless communications networks that depend upon aforementioned centralized controls. In certain circumstances, if desired, the fixed application specific communication apparatus reports the status of an electrical load control device, by transmitting data information on aforesaid data control channels that reflect whether the load control device detects voltage or not.

Detailed Description Text (30):
The electrical load control device can be commanded to turn on an electrical device or turn it off, by receiving said messages or instruction commands directly from data control channels, which are being operated by aforementioned wireless communications networks. These data messages or instruction commands originate from an Application Specific Central Monitoring Station which is connected by various communications means to a Master Central Monitoring Station (MCMS) which is connected to a Home Switching or Mobile Switching Center which is an integral central operating and communications control point in any of the aforementioned wireless communication networks.

Detailed Description Text (31):
The preferred embodiment of the present invention provides computer terminal displays, which project status reports of various application specific stationary and mobile location devices. Such common devices include facsimile machines, consumer level computer systems and other related devices which can act as application specific central monitoring stations for fleet management configurations and motor vehicle anti-theft and recovery configurations. The fixed location elements or devices can be customized to a particular user's needs and due to the preferred embodiment's total adaptability and flexibility may be installed and used virtually anywhere in the world. Of great significance is that the method and apparatus of the present invention does not require any wireless communication network infrastructure upgrades, extensive modifications and is immediately applicable and usable with the aforementioned wireless communications systems.

Detailed Description Text (32):
Referring now to FIG. 1A and FIG. 1B which show a preferred embodiment of invention including a set of "Stationary Units" 107A-107B, and a set of "Mobile Units" 108A-108B. A stationary unit may represent any sort of fixed, non moveable interface application such as a electrical load control management apparatus, video game management system, security system status reporting, roadside call box, or any other stationary communications application. The present invention acts as a communications interface, or enabler of communications for the operations and remote control of said fixed systems. A mobile unit can be attached and interfaced with any sort of moveable object like a motor vehicle, a person holding or wearing a communicator apparatus as in a home arrest application, medical alert application, or a cargo shipping container which contains the present inventions communications enabling technology. Such mobile objects or persons are to be monitored, located and tracked. A communications link is provided, which is represented by wireless communications transmission towers 109A and 109B, Base Stations 106A and 106B, Mobile Switching Centers 104 and 105, Integrated Services Digital Network (ISDN) 112A-112C, Public Switched Telephone Network (PSTN) 111, which carry specialized data strings which are manipulated, translated and encrypted, data control channel information between the Stationary Unit 107A, 107B and the Mobile Unit 108A, 108B, and a Master Central Monitoring Station (MCMS) 100 and a Application Specific Central Monitoring Station (ASCMS) 101.

Detailed Description Text (34):
In normal control channel operations and digital traffic channel operations, data bit streams contain reserved formats, filler messages, and user data. Such data are data bits that essentially take up space in a synchronous control channel and digital traffic channel message. These reserved formats, filler messages, or user data bits can be used in the method and apparatus of the present invention to provide Additional Application Specific Messaging Data (AASMD) 433 on the Control Channels and Digital Traffic Channels of Cellular Mobile Telephone (CMT), Enhanced Mobile Radio (ESMR) Satellite Cellular Hybrid (SCH), or any other wireless communications system that uses reserved formats, filler data, and user data, in the control channel and digital traffic channel messaging schemes. These communication systems rely upon centralized control for aforementioned operations. The mobile unit and stationary unit send and receive application specific status messages and command or instructional messages. When the stationary unit is transmitting status or any other information, it is sent to the nearest Transmission Tower 109A or 109B and Base Station 106A or 106B. Aforesaid transmitted data is then relayed to its Mobile Switching Center (MSC) 104 or 105, and then relayed to the Master Central Monitoring Station (MCMS) 100.

Detailed Description Text (41):
In FIG. 1A the Master Comparative Data Base terminal (MCDB) 115 preferably collects decoded data from the Master Decoder terminal (MDEC) 114. While in FIG. 7, the Master Comparative Data Base (MCDB) 115 receives decoded data and searches which customer or client this particular string of data is attributed too. The Electronic Serial Number (ESN) 427 is preferably the set of numbers that identify the type of Mobile Unit or Stationary Unit communications apparatus that is installed in a particular motor vehicle. Also the ESN identifies who the customer or client is, and other pertinent data such as his address, make of vehicle, and the like. This is designated as Client Data 440. Client Data 440 also indicates the relative position of clients vehicle, velocity, and alarm status. During an alarm or emergency situation, this Client Data 440 is relayed to a designated Application Specific Central Monitoring Station or Dispatch Center. Referring to FIG. 1A, the Master Comparative Data Base 115 relays Client Data to the Application Specific Monitoring Station (ASMS) 100. As depicted here, this Application Specific Central Monitoring Station shows many different types of application specific terminals, which manage different application specific systems and services. In application, however, these various systems and services will be physically located in many different central monitoring stations or dispatch centers located throughout a

city, a region, a country or the entire world. For example a Home Arrest (HA) Application Specific Terminal 120C can be located at another physical site, and the Master Central Monitoring Station will relay client data and status, for example, to this terminal via an Integrated Services Digital Network Interface (ISDN) 112A, the Public Switch Telephone Network (PSTN) 111 and another ISDN interface 112C and finally to the Home Arrest (HA) Application Specific Terminal 120C via an Application Specific Data Reception & Distribution Routing Terminal 127 and internal fiber optic or hardwire conductors of the Data Receive Digital Data Pathway 132 located inside an Application Specific Central Monitoring Station 101.

Detailed Description Text (56):
Referring now to FIG. 8C, a global positioning system receiver is shown and the interface with communications apparatus 210 via input and output ports, thereby allowing data bits to flow back and forth between the two apparatus as shown in FIG. 8A. Together, FIGS. 8A and 8B illustrate a compete mobile unit, configured for example, for locating, tracking, and protecting a motor vehicle as used in automobile tracking and anti-theft applications. Of course, this combined mobile unit may also be used for a wide variety or other applications such as fleet management of motor vehicles, including trucks, taxis, ambulances, police vehicles, and other public and private fleet vehicles. For example, Auto Security System 315 detects a vehicle intrusion which is indicated by an open contact closure 316 which is preferably fitted to a vehicle door, trunk lid, or hood. Auto Security System 315 having detected an intrusion send alarm data and status information to Communications Apparatus 210 via an Input Port conductor 317 and to Microcomputer 200 which instructs the integrated circuits to send manipulated and translated data through the Radio Frequency Circuit 241 and on through the Wireless Network and to the central monitoring stations in the aforementioned manner, whereby the Master Central Monitoring Station (MCMS) and the Application Specific Central Monitoring Station (ASCMS) receives, processes, and responds to the manipulated and the translated data in relation to its status.

CLAIMS:

8. In a wireless data communications network that includes a voice channel for transmitting voice data and a control channel for transmitting control data that controls access to and use of the voice channel, a method for transmitting messages from a central monitoring station to a remote device coupled to a communicator, over the control channel of the wireless data communications network, comprising:

a) encoding at the central monitoring station a message comprising data related to a specific application to create an encoded message for transmission over the control channel as control signals to the communicator, comprising retrieving from a memory accessible by the central monitoring station one of a plurality of alternative Mobile Identification Numbers (MINs) in which one of a plurality of alternative messages is encoded; and

b) transmitting the encoded message from the central monitoring station over the control channel as control signals, bypassing the voice channel, to the communicator.

Previous Doc Next Doc Go to Doc#

9/776,188

4

L18: Entry 1 of 1 File: USPT Aug 1, 2000

US-PAT-NO: 6097429
DOCUMENT-IDENTIFIER: US 6097429 A

TITLE: Site control unit for video security system

DATE-ISSUED: August 1, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Seeley; John E.	Bucks County	NJ		
Vogt; William R.	Morris County	NJ		
Hobson; Gregory L.	St. Charles County	MO		
Dunn; Randal L.	St. Charles County	MO		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Esco Electronics Corporation	St. Louis	MO			02
ADT Services AG	Schaffhausen			CH	03

APPL-NO: 08/ 904510 [PALM]
DATE FILED: August 1, 1997

PARENT-CASE:
CROSS-REFERENCE TO RELATED APPLICATIONS The subject matter contained in this application is related to U.S. patent application Ser. No. 08/722,731, "Low False Alarm Rate Detection for Video Image Processing Based Security Systems," filed Dec. 23, 1996; now U.S. Pat. No. 5,956,424 U.S. patent application Ser. No. 08/757,838, "Authentication Algorithms for Video Images," filed Nov. 27, 1996; now U.S. Pat. No. 5,870,471 U.S. patent application Ser. No. 08/771,991 "Reduction in False Alarms of Image Processing Based Security Systems by Performing Classification of Objects Detected," filed Dec. 23, 1996; and U.S. patent application Ser. No. 08/772,595, "Rejection of Light Intrusion False Alarms in Video Security Systems," filed Dec. 23, 1996, now U.S. Pat. No. 5,937,092.

INT-CL: [07] H04 N 7/18

US-CL-ISSUED: 348/154; 348/159
US-CL-CURRENT: 348/154; 348/159

FIELD-OF-SEARCH: 348/152, 348/153, 348/154, 348/155, 348/159

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected | Search ALL | Clear

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
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☐	4249207	February 1981	Harman et al.	
☐	4257063	March 1981	Loughry et al.	
☐	4458266	July 1984	Mahoney	
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☐	4692806	September 1987	Anderson et al.	
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☐	5239459	August 1993	Hunt et al.	
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☐	5491511	February 1996	Odle	
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☐	5530429	June 1996	Hablov et al.	
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☐	5602585	February 1997	Dickinson et al.	
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☐	5895453	April 1999	Cook	348/153
☐	5923364	July 1999	Rhodes	348/159
☐	5926209	July 1999	Glatt	348/143

ART-UNIT: 273

PRIMARY-EXAMINER: Britton; Howard

ATTY-AGENT-FIRM: Polster, Lieder, Woodruff & Lucchesi, L.C.

ABSTRACT:

A site control unit (12) located at a premises (F) processing video images obtained from a plurality of cameras (22) located about the premises and relaying the presence of a real intrusion to a central station (CS). The site control unit has an image acquisition module (24) receiving video images from the cameras. An image processor (30) processes the images to eliminate possible causes of false alarms of an intrusion and reliably detecting actual intrusions. The processor includes video masking (32) to filter known motion present within a scene, detection (34) detecting movement in unmasked portions of the scene, and recognition (36) classifying the cause of the movement. An indication of an intrusion is given only if the cause is one of a class of predetermined causes representing an intruder on the premises, or an unknown cause. A video recorder (38) records images of the actual intrusion and supplies recorded images to a security system operator (O) who informs authorities of in intrusion. The video recorder produces snapshots (X1-Xn) of a scene viewed by the camera detecting the intrusion detected, authenticates (42) the snapshots, and transmits (46) the snapshots for viewing by the operator.

49 Claims, 11 Drawing figures

Previous Doc Next Doc Go to Doc#

L18: Entry 1 of 1 File: USPT Aug 1, 2000

DOCUMENT-IDENTIFIER: US 6097429 A
TITLE: Site control unit for video security system

Application Filing Date (1):
19970801

Assignee Name (2):
ADT Services AG

Assignee Group (2):
ADT Services AG Schaffhausen CH 03

Brief Summary Text (8):
False alarms plague the security system industry. While the situation is annoying when a false alarm is relayed to a local monitoring station, it becomes even worse when the alarm is relayed 2,000 miles or more to a security company's remote central station. Here, operators must use their experience of the particular circumstances surrounding the alarm (i.e., local weather conditions, past occurrences at that particular site, etc.), in order to make a determination as to whether or not the alarm is real. If their knowledge and experience tells them the alarm signifies an actual intrusion, they must then relay the alarm to the local police for that site so the police can conduct a further investigation.

Brief Summary Text (9):
There are numerous examples of when an alarm either did not work, or was rendered ineffective, simply because an operator at a control station had no insight into the facility where the alarm system was installed and from which an alarm emanated. In one anecdotal example, an alarm was triggered by a cat left in a residence. The police were called but discovered nothing, not even the cat, because the cat hid from strangers. After this situation repeated itself over a period of several hours, the police finally refused to investigate further. From that point on, the residence was essentially not protected. Over the years, situations resulting from false alarms have continued to worsen. Now, police often require some confirmation or evidence of an intrusion before investigating, or else they will give priority to those situations where they have greater certainty an intrusion has occurred. Security system companies have addressed this issue by providing an audio (or "listening-in") capability to the system. This enables the monitor to hear actual movement on the premises, the sound of voices, glass breaking, cabinets or drawers being opened, etc., with this information also being relayed to the authorities. Furthermore, in many locales, if the authorities investigate the report of an alarm and discover nothing, they will send the security company requesting the investigation a bill for their services.

Brief Summary Text (10):
In response to this situation, the security industry has begun to extensively use video cameras to constantly monitor premises. Use of cameras solves the problem of not just reacting to a make/break contact. The shortcomings with camera surveillance is that one needs to have a continuously connected communication

channel with the sensor (camera), and the operator at the local or remote console must continuously monitor the video. Some systems have attempted to combine video with another sensing mechanism, I.R., for example, so that actuation of the video is controlled by the other sensor first sensing the presence of an intruder. For, if video is continuously required for a properly functioning system, a communications channel must be connected between the site and the monitoring station from the time the alarm system is energized. Because a monitoring period often exceeds 12 hours, the communication costs are high. To further control costs, the cameras employed at the monitored site are often slow scan cameras whose output is compressed onto POTS (plain old telephone system) lines (typically using 28.8k modems) with transmission rates of 1 frame of video over a 1-5 second interval. At the receiving end, the operator now must deal with two issues. First, because the frame rate is slow, what the operator sees is not what is necessarily occurring at that moment. Second, and more importantly, most of the time the operator will see nothing out of the ordinary. Yet, the operator must maintain a constant vigilance. This is a serious problem because it has been estimated that after watching a security system camera observing an unchanging scene for as little as 5 minutes, an operator's performance diminishes rapidly to the point where the operator is essentially ineffective after 30 minutes. One result of this, of course, is that false alarms still occur. As a consequence, the only real advantage video monitoring offers is that should an intrusion occur and should the operator notice it, then the relayed information sent to the local police will get high priority because of the certainty of the situation. Apart from this distinct advantage, the deficiencies of such a system are that it is very labor intensive, operator efficiency is usually very low, and communications costs are very high.

Brief Summary Text (11):
To overcome these problems while still providing the alarm system operator live images of an intrusion is the subject of the present invention. For, it is now possible, using the SCU described herein, to relay definitive information to the local police of an intrusion, as well as capture, maintain, and transmit images of the intrusion to the police or other authorities.

Detailed Description Text (2):
Referring to the drawings, an alarm or video security system 10 shown in FIG. 1 includes a site control unit (SCU) 12 which is physically located at an installation or facility F being monitored by the system. Alarm system 10 is fully described in co-pending application 08/904,509. The SCU has an associated imaging means 14 and operation of the SCU and the imaging means is described hereinafter. An output from the SCU is directed to an alarm unit 16 whose operation is described in co-pending application 08/904,949. The SCU further provides an output to a central station CS via a terminal adapter 20. An operator O monitors the facility from the central station CS and the information (images, audio, data) provided him or her by the SCU. The operator evaluates this information and, when necessary, informs police, fire, medical, or other authorities of a condition detected at the facility where SCU 12 is located. At the central station, a router 100, video server 102, and a central alarm computer 104, are interconnected with a plurality of workstations 106 to display video images and other information to the operator to assist the operator in determining whether the intrusion requires alerting the authorities. Operation of the alarm unit is described in co-pending application 08/904,949, and that o f the terminal adapter in co-pending application 08/904,913. With respect to the central station, operation of the work station is more fully described in co-pending application, 08/904,947, that of the central alarm computer in co-pending application 08/904,948.

Detailed Description Text (3):
All of the applications referred to in the above paragraph are now commonly assigned to ADT Services AG, a Swiss corporation.

Detailed Description Text (18):

While operator O is viewing the scene from the camera 22 from which the first event occurred, SCU 12 continues to monitor the rest of the facility with the other cameras being used. Should one or more of these cameras also detect the presence of an intruder, then operator O will be alerted to these occurrences as well with the SCU now providing snapshots from these other cameras as well as those from the first camera. Once the authorities hare been alerted, operator O can turn his attention to viewing snapshots from other cameras. All video communications between SCU 12 and the central station are stored for later analysis at video server 102. As noted, by the time a communications path is established between the SCU and the central station, the SCU will have stored a number of snapshots. Upon request by the operator, "thumbnails," or abbreviated snapshots are transmitted to a workstation 106 at the central station where they can be arranged in a mosaic pattern by the operator for his or her viewing. After viewing the thumbnails, the operator can select one or more of the images for transmission from SCU 12 to the system control. Reviewing thumbnails is comparable to reviewing multiple photographic slides a t once, with the intent to select one or more for "blowing up" to full size prints. In the preferred embodiment, a thumbnail is 1/16 the size of a snapshot (i.e. every fourth pixel and every fourth row of a frame as depicted in FIG. 8A and shown as in FIG. 8B) and can therefore be transmitted in 1/16 the time of a snapshot. After viewing the snapshots, the operator can select one or more full size images (snapshots) for transmission. This new transmission of snapshots is at a slower rate using lossless compression techniques and full RS170 resolution. This is useful for identification purposes, and for confirmation of details to the police. Eventually all snapshots may be transferred from the SCU using lossless compression. Each snapshot is authenticated again using the process described in co-pending application 08/757,838. In addition to being authenticated at the source (i.e., SCU 12), each snapshot is verified upon reception at the central station so verified, authenticated images can be later used for prosecution purposes.

Previous Doc Next Doc Go to Doc#

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L19	L18	1	L19
L18	L16 and (police or emergen$)	1	L18
L17	L16 and (police and emergen$)	0	L17
L16	L15 and @ad<=20010205	3	L16
L15	adt$ and (residen$ same security)	12	L15
L14	L9 and (residen$ same security)	5	L14
L13	L9 and security	80	L13
L12	L9 and adt$	0	L12
L11	L9 and adt and security	0	L11
L10	L9 and adt ans security	165038	L10
L9	L8 and (emergency and police)	106	L9
L8	L7 and (wireless$ near2 communicat$)	1770	L8
L7	@ad<=20010205 and ((diagnos$ or communicat$ or wireless$) with manufactur$)	15168	L7
L6	L5 and ((diagnos$ or communicat$ or wireless$) with manufactur$)	4	L6

L5	L4 and @ad<=20010205	5	L5
L4	L3 and obd$	27	L4
L3	L2 and wireless$	190	L3
L2	L1 and acceler$	2663	L2
L1	vehicle and diagnos$.clm.	8392	L1

END OF SEARCH HISTORY

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Search Results - Record(s) 1 through 5 of 5 returned.

☐ 1. Document ID: US 20010048215 A1

L5: Entry 1 of 5 File: PGPB Dec 6, 2001

PGPUB-DOCUMENT-NUMBER: 20010048215
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20010048215 A1

TITLE: Integrated occupant protection system

PUBLICATION-DATE: December 6, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Breed, David S.	Boonton Township	NJ	US	
DuVall, Wilbur E.	Kimberling City	MO	US	
Johnson, Wendell C.	Signal Hill	CA	US	
Sanders, William Thomas	Rockaway Township	NJ	US	

US-CL-CURRENT: 280/728.1; 280/734, 280/735

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 2. Document ID: US 20010015548 A1

L5: Entry 2 of 5 File: PGPB Aug 23, 2001

PGPUB-DOCUMENT-NUMBER: 20010015548
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20010015548 A1

TITLE: Automotive electronic safety network

PUBLICATION-DATE: August 23, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Breed, David S.	Boonton Township	NJ	US	
DuVall, Wilbur E.	Kimberling City	MO	US	
Johnson, Wendell C.	Signal Hill	CA	US	
Sanders, William Thomas	Rockaway Township	NJ	US	

US-CL-CURRENT: 280/735

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Ds

☐ 3. Document ID: US 6868386 B1

L5: Entry 3 of 5 File: USPT Mar 15, 2005

US-PAT-NO: 6868386
DOCUMENT-IDENTIFIER: US 6868386 B1

TITLE: Monitoring system for determining and communicating a cost of insurance

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw Ds

☐ 4. Document ID: US 6636790 B1

L5: Entry 4 of 5 File: USPT Oct 21, 2003

US-PAT-NO: 6636790
DOCUMENT-IDENTIFIER: US 6636790 B1

TITLE: Wireless diagnostic system and method for monitoring vehicles

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw Ds

☐ 5. Document ID: US 6533316 B2

L5: Entry 5 of 5 File: USPT Mar 18, 2003

US-PAT-NO: 6533316
DOCUMENT-IDENTIFIER: US 6533316 B2

TITLE: Automotive electronic safety network

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw Ds

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Previous Page Next Page Go to Doc#

L5: Entry 4 of 5 File: USPT Oct 21, 2003

US-PAT-NO: 6636790
DOCUMENT-IDENTIFIER: US 6636790 B1

TITLE: Wireless diagnostic system and method for monitoring vehicles

DATE-ISSUED: October 21, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Lightner; Bruce	La Jolla	CA		
Borrego; Diego	San Diego	CA		
Myers; Chuck	La Jolla	CA		
Lowrey; Larkin Hill	La Jolla	CA		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Reynolds and Reynolds Holdings, Inc.	Dayton	OH			02

APPL-NO: 09/ 776106 [PALM]
DATE FILED: February 1, 2001

PARENT-CASE:
RELATED APPLICATION Under 35 U.S.C. .sctn.119(e)(1), this application claims benefit of prior U.S. Provisional Applications No. 60/222,152, entitled "Wireless Diagnostic System for Characterizing a Vehicles Exhaust Emissions" filed Aug. 1, 2000; and No. 60/222,213, entitled "Wireless Diagnostic System for Characterizing One or More Vehicles' Mileage, Fuel Level, and Period of Operation" filed Aug. 1, 2000, both of which are incorporated herein by reference; and it claims benefit of prior U.S. Provisional Application No. 60/220,986 entitled "Wireless Diagnostic System for Vehicles" filed Jul. 25, 2000. In addition, this application is related to the following U.S. Patent Applications that were filed on the same day as the present application: (1) U.S. Patent Application entitled "Wireless Diagnostic System for Characterizing a Vehicles Exhaust Emissions" with inventors Matthew J. Banet, Bruce Lightner, Diego Borrego, Chuck Myers, and Larkin H. Lowrey (U.S. Ser. No. 09/776,033); and (2) U.S. Patent Application entitled "Wireless Diagnostic System for Characterizing One or More Vehicles' Mileage, Fuel Level, and Period of Operation" with inventors Matthew J. Banet, Bruce Lightner, Diego Borrego, Chuck Myers, and Larkin H. Lowrey (U.S. Ser. No. 09/776,083), both of which are hereby incorporated by reference.

INT-CL: [07] G06 F 7/00

US-CL-ISSUED: 701/33; 701/29
US-CL-CURRENT: 701/33; 701/29

FIELD-OF-SEARCH: 701/29, 701/30, 701/33, 701/35, 73/116, 73/117.2

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected | Search ALL | Clear

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	5442553	August 1995	Parrillo	364/424.04
☐	5479479	December 1995	Braitberg et al.	379/58
☐	5574427	November 1996	Cavallaro	340/430
☐	5732074	March 1998	Spaur et al.	370/313
☐	5758300	May 1998	Abe	701/33
☐	5797134	August 1998	McMillan et al.	705/400
☐	6064970	May 2000	McMillan et al.	705/4
☐	6295492	September 2001	Lang et al.	701/33

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
WO 00/79727	December 2000	WO	

ART-UNIT: 3661

PRIMARY-EXAMINER: Beaulieu; Yonel

ATTY-AGENT-FIRM: Hale and Dorr LLP

ABSTRACT:

A method and apparatus for remotely characterizing a vehicle's performance is described. The method features the steps of: i) generating data representative of the vehicle's performance with at least one microcontroller disposed within the vehicle; ii) transferring the data through an OBD, OBD-II or equivalent electrical connector to a data collector/router that includes a microprocessor and an electrically connected wireless transmitter; iii) transmitting a data packet representing the data with the wireless transmitter over an airlink to a wireless communications system and then to a host computer; and iv) analyzing the data packet with the host computer to characterize the vehicle's performance.

36 Claims, 4 Drawing figures

Previous Doc Next Doc Go to Doc#

L6: Entry 3 of 4 File: USPT Oct 21, 2003

DOCUMENT-IDENTIFIER: US 6636790 B1
TITLE: Wireless diagnostic system and method for monitoring vehicles

Abstract Text (1):
A method and apparatus for remotely characterizing a vehicle's performance is described. The method features the steps of: i) generating data representative of the vehicle's performance with at least one microcontroller disposed within the vehicle; ii) transferring the data through an OBD, OBD-II or equivalent electrical connector to a data collector/router that includes a microprocessor and an electrically connected wireless transmitter; iii) transmitting a data packet representing the data with the wireless transmitter over an airlink to a wireless communications system and then to a host computer; and iv) analyzing the data packet with the host computer to characterize the vehicle's performance.

Application Filing Date (1):
20010201

Parent Case Text (2):
Under 35 U.S.C. .sctn.119(e)(1), this application claims benefit of prior U.S. Provisional Applications No. 60/222,152, entitled "Wireless Diagnostic System for Characterizing a Vehicles Exhaust Emissions" filed Aug. 1, 2000; and No. 60/222,213, entitled "Wireless Diagnostic System for Characterizing One or More Vehicles' Mileage, Fuel Level, and Period of Operation" filed Aug. 1, 2000, both of which are incorporated herein by reference; and it claims benefit of prior U.S. Provisional Application No. 60/220,986 entitled "Wireless Diagnostic System for Vehicles" filed Jul. 25, 2000.

Parent Case Text (3):
In addition, this application is related to the following U.S. Patent Applications that were filed on the same day as the present application: (1) U.S. Patent Application entitled "Wireless Diagnostic System for Characterizing a Vehicles Exhaust Emissions" with inventors Matthew J. Banet, Bruce Lightner, Diego Borrego, Chuck Myers, and Larkin H. Lowrey (U.S. Ser. No. 09/776,033); and (2) U.S. Patent Application entitled "Wireless Diagnostic System for Characterizing One or More Vehicles' Mileage, Fuel Level, and Period of Operation" with inventors Matthew J. Banet, Bruce Lightner, Diego Borrego, Chuck Myers, and Larkin H. Lowrey (U.S. Ser. No. 09/776,083), both of which are hereby incorporated by reference.

Brief Summary Text (2):
The present invention relates generally to the use of wireless communications and diagnostic systems in automotive vehicles.

Brief Summary Text (4):
The Environmental Protection Agency (EPA) requires vehicle manufacturers to install on-board diagnostics (OBD) for emission control on their light-duty automobiles and trucks beginning with model year 1996. OBD systems (e.g., computer, microcontrollers, and sensors) monitor the vehicle's emission control systems to detect any malfunction or deterioration that causes emissions to exceed EPA-mandated thresholds. Such a system, for example, is an oxygen sensor located in the vehicle's exhaust manifold and tailpipe.

Brief Summary Text (5):
The EPA requires that all information monitored or calculated by OBD systems is made available through a standardized, serial 16-cavity connector referred to as the ALDL (Assembly Line Diagnostic Link) or OBD connector. All physical and electrical characteristics of this connector are standard for all vehicles sold in the United States after 1996. The EPA also mandates that, when emission thresholds are exceeded, diagnostic information characterized by OBD systems must be stored in the vehicle's central computer so that it can be used during diagnosis and repair.

Brief Summary Text (6):
A second generation of OBD systems ("OBD-II" systems) monitors a wide range of data that indicate the performance of the host vehicle. For example, these data can be analyzed to infer the vehicle's emission performance. In addition to emissions, OBD-II systems monitor vehicle speed, mileage, engine temperature, and intake manifold pressure. OBD-II systems also query manufacturer-specific data, such as data relating to the vehicle's engine, transmission, brakes, alarm, entertainment systems. OBD-II systems also monitor codes called diagnostic trouble codes, or "DTCs", which indicate a mechanic or electrical problem with the vehicle. DTCs are the codes that typically light a vehicle's `service engine soon` light. In total, OBD-II systems typically access more than 300 segments of data relating to the performance and make of the host vehicle.

Brief Summary Text (7):
In addition to the OBD-II systems, most vehicles manufactured after 1996 have electronic control units (ECUs) that control internal electromechanical actuators. Examples include ECUs that control fuel-injector pulses, spark-plug timing, and anti-lock braking systems. Most ECUs transmit status and diagnostic information over a shared, standardized electronic buss in the vehicle. The buss effectively functions as an on-board computer network with many processors, each of which transmits and receives data. The primary computers in this network are the vehicle's electronic-control module (ECM) and power-control module (PCM). The ECM typically accesses computers and microcontrollers that monitor or control engine functions (e.g., the cruise-control module, spark controller, exhaust/gas recirculator). The PCM typically controls or monitors ECUs associated with the vehicle's power train (e.g., its engine, transmission, and braking systems).

Brief Summary Text (8):
When a vehicle is serviced, data from the standardized buss can be queried using external engine-diagnostic equipment (commonly called `scan tools`) that connect to the above-described 16-cavity electrical connector (called an OBD-II connector for vehicles made after 1996). The OBD-II connector is typically located under the vehicle's dashboard on the driver's side. Data transferred through the connector to the scan tool yields data that identify a status of the vehicle and whether or not a specific component of the vehicle has malfunctioned. This makes the service process more efficient and cost-effective.

Brief Summary Text (9):
Some manufacturers include complex electronic systems in their vehicles to access and analyze the above-described data. These systems are not connected through the OBD-II connector, but instead are wired directly to the vehicle's electronic system. This wiring process typically takes place when the vehicle is manufactured. In some cases these systems transmit data through a wireless network.

Brief Summary Text (11):
It is an object of the present invention to address the limitations of the conventional engine-diagnostic systems discussed above. Specifically, it is an object of the invention to both access and send data over the ODB-II connector using a remote, wireless system that connects to the Internet using an airlink. The device used for accessing and transmitting the data is simple, low-cost, and easy-

to-install.

Brief Summary Text (12):
In one aspect, the invention features a method and apparatus for remotely characterizing a vehicle's performance. The method features the steps of: i) generating data representative of the vehicle's performance with at least one microcontroller disposed within the vehicle; ii) transferring the data through an OBD, OBD-II or equivalent electrical connector to a data collector/router that includes a microprocessor and an electrically connected wireless transmitter; iii) transmitting a data packet representing the data with the wireless transmitter over an airlink, to a wireless communications system, and then to a host computer; and iv) analyzing the data packet with the host computer. Once analyzed, the data can be used to characterize the vehicle's performance, e.g. evaluate the vehicle's electrical and mechanical systems. The data can also be used for other purposes, such as for insurance-related issues, surveys, and vehicle tracking.

Brief Summary Text (13):
The terms `microcontroller` and `microprocessor` refer to standard electronic devices (e.g., programmable, silicon-based devices) that can control and/or process data. For example, a sensor disposed in the vehicle (e.g., an oxygen sensor) would be a microcontroller. "Airlink" refers to a standard wireless connection between a transmitter and a receiver.

Brief Summary Text (14):
In the above-described method, steps i)-iv) can be performed at any time and with any frequency, depending on the diagnoses being performed. For a `real-time` diagnoses of a vehicle's engine performance, for example, the steps may be performed at rapid time or mileage intervals (e.g., several times each minute, or every few miles). Alternatively, other diagnoses (e.g. a `smog check` that includes inferring the concentrations of hydrocarbons, oxides of nitrogen, or carbon monoxide) may require the steps to be performed only once each year or after a large number of miles are driven. Steps i)-iii) (i.e. the `generating`, `transferring`, and `transmitting` steps) may be performed in response to a signal sent from the host computer to the vehicle. Alternatively, the vehicle may be configured to automatically perform these steps at predetermined or random time intervals.

Brief Summary Text (15):
The generating step typically includes generating data encoded in a digital format using the vehicle's electronic control unit (ECM) and/or power control unit (PCM). The data, for example, describes the vehicle's mileage, exhaust emissions, engine performance, engine temperature, coolant temperature, intake-manifold pressure, engine-performance tuning parameters, alarm status, accelerometer status, cruise-control status, fuel-injector performance, spark-plug timing, and/or a status of an anti-lock braking system. The data can also be a DTC or related code. The analyzing step features extracting data from the transmitted data packet, and then storing the data in a computer memory or database.

Brief Summary Text (16):
Once stored, the data is processed in a variety of ways. For example, the processing can simply involve determining the vehicle's odometer reading, and then comparing this reading to a schedule that lists recommended, mileage-dependent service events (e.g., a 5000-mile tune-up). Other algorithms include those that compare current data with data collected at an earlier time to dynamically characterize the performance of the vehicle. In another example, the algorithms compare the data with a predetermined numerical value or collection of values. For example, the data can correspond to a level of the vehicle's exhaust emissions or mileage; these values can then be compared to predetermined values for the particular vehicle to characterize its performance. More complex processing can include, for example, analyzing the data with a mathematical algorithm to predict

the electrical or mechanical performance of the vehicle or a failure of a particular component.

Brief Summary Text (17):
After the processing step, the method can also include the step of sending an electronic text, data, or voice message to a computer, cellular telephone, personal digital assistant or wireless device to alert the end-user of a potential problem. The results from the analysis can also be displayed on similar devices connected to the World-Wide Web or the Internet.

Brief Summary Text (18):
In another embodiment, the method additionally includes the step of sending a second data packet from the host computer system over an airlink to the wireless communications system and then to the vehicle's data collector/router. In this case, the second data packet is processed by the microprocessor in the data collector/router to generate a signal that is sent to at least one of the vehicle's microcontrollers. There, the signal is processed and used, for example to adjust a setting in the particular microcontroller. The signal can also be used to update or distribute new software or firmware configurations to one or more of the vehicle's microcontrollers. In still other embodiments, the signal can be used to make `tailored` readings of the vehicle's diagnostic information, e.g. to perform complex diagnoses (sometimes called `drilling down`) and isolate malfunctioning components in the vehicle's mechanical or electrical systems.

Brief Summary Text (19):
In another aspect, the invention features a method for sending data to an electrical system in a vehicle. The method features the steps of: i) generating with a host computer a data packet that affects at least one microcontroller disposed within the electrical system of the vehicle; ii) transmitting the data packet from the host computer over an airlink to a wireless communications system and then to a data collector/router (containing a microprocessor and wireless transmitter similar to that described above) disposed in the vehicle; iii) receiving the data packet with the wireless transmitter and sending it to the microprocessor; iv) processing the data packet with the microprocessor to generate data; and v) transmitting the data through an OBD, OBD-II or equivalent electrical connector to the microcontroller disposed within the vehicle's electrical system.

Brief Summary Text (20):
The invention has many advantages. In particular, wireless transmission of a vehicle's diagnostic data makes it possible to remotely identify potential problems without bringing the vehicle to a conventional service center. For example, the system can be configured so that when a DTC is generated by a vehicle the code associated with it is automatically sent to the web sites of a service center and the vehicle owner. This way, the service center can diagnose the problem, order the required parts, and schedule the service before the vehicle owner actually brings in the vehicle for service. In certain situations, potential problems with the vehicle can be remotely predicted and addressed before they actually occur. Moreover, data from the vehicle can be queried, stored and analyzed frequently and in real-time (i.e., while the vehicle is actually in use) to provide a relatively comprehensive diagnosis that is not possible in a conventional service center.

Brief Summary Text (21):
The device used to access and transmit the vehicle's data is small, low-cost, and can be easily installed in nearly every vehicle with an OBD-II connector in a matter of minutes. It can also be easily transferred from one vehicle to another, or easily replaced if it malfunctions.

Brief Summary Text (22):
Communication with the vehicle's OBD buss can also be bi-directional, making it possible to actually repair certain problems remotely. This, of course, means that

in some cases the vehicle's problem can be both diagnosed and repaired in a completely remote and unobtrusive manner.

Brief Summary Text (23):
Data transmitted from the vehicle can also be analyzed for purposes unrelated to mechanical or electrical problems. For example, the data can be collected and analyzed in real-time to characterize driving patterns (e.g. a vehicle's speed), automotive part reliability, and emission characteristics. Lessors and renters of vehicles can remotely track mileage for billing purposes. Smog and emission certifications can be easily done in a completely remote manner. Data can also be analyzed to determine the vehicle's approximate location as a safety or anti-theft measure.

Brief Summary Text (24):
Another advantage of the invention is that data transmitted from a particular vehicle over a wireless airlink can be accessed and analyzed through the Internet without the need for expensive diagnostic equipment. Software used for the analysis can be easily modified and updated, and then used by anyone with access to the Internet. This obviates the need for vehicle service centers to upgrade their diagnostic equipment for next-generation vehicles. The resulting data, of course, have many uses for vehicle owners, surveyors of vehicle performance (e.g., J. D. Power), manufacturers of vehicles and related parts, and vehicle service centers.

Brief Summary Text (25):
Sophisticated analysis of the above-mentioned data yields information that benefits the consumer, vehicle and parts manufacturers, vehicle service centers, and the environment.

Drawing Description Text (3):
FIG. 1 is a schematic drawing of a wireless diagnostic system in wireless contact with a system of vehicles and the Internet;

Drawing Description Text (4):
FIG. 2 is a schematic drawing of a data collector/router used in each of the vehicles of FIG. 1;

Detailed Description Text (2):
FIG. 1 shows a wireless diagnostic system 10 that communicates with a collection of vehicles 30 using a host computer system 12 and a standard wireless communications system 15. The wireless communications system 15 is, e.g., a conventional wireless telephone or paging system (e.g., Bell South's `Mobitex` System). Each vehicle 32a, 32b, 32n in the collection of vehicles 30 features a data collector/router 35a, 35b, 35n that queries data generated by each vehicle's ECU and OBD-II systems through an OBD buss. After the query, each data collector/router 35a, 35b, 35n receives data from the host vehicle 32a, 32b, 32n and sends it as a data packet over a wireless airlink 38 to the wireless communication system 15. The wireless communication system 15 features a standard hardware component 19 (e.g. a system of transmission `base stations`, computers, and switching and routing hardware) and software component 17 (e.g., a paging or cellular network) that relay the data packet through a digital line 40 to the host computer system 12.

Detailed Description Text (4):
Data packets from each data collector/router 35a, 35b, 35n can also be accessed directly over an airlink 70 by wireless telephones 62a, 62b, 62n in a wireless telephone network 60. In this case each wireless telephone 62a, 62b, 62n has an airlink modem 65a, 65b, 65n that allows the data packet to be accessed directly. Alternatively, using the airlink modem 65a, 65b, 65n, the wireless telephones 62a, 62b, 62n can access processed data from the web server 26, provided they have the appropriate software (e.g., web-browsing capabilities). In this case, the web server 26 formats the data in a manner suitable to wireless browsing (e.g. wireless

access protocol).

Detailed Description Text (5):
The host computer system 12 typically works bi-directionally, i.e. it can both send data to and receive data from the data collector/routers 35a, 35b, 35n present on each vehicle 32a, 32b, 32n. For example, following a query, the host computer system 12 receives a data packet from a particular data collector/router. The system typically runs a real-time operating system (e.g., Windows NT.RTM. or Unix.RTM.) that manages multiple software programs conducting different functions (e.g. data processing and storage).

Detailed Description Text (6):
Data is typically sent from the host vehicle 32a, 32b, 32n to each data collector/router 35a, 35b, 35n at a predetermined time interval (e.g. a random or periodic time interval) that is programmed in either the data collector/router or the actual vehicle. For example, data can be sent on a daily basis. Alternatively, data can be queried in response to a signal sent from the host computer system 12 to the data collector/routers 35a, 35b, 35n present on each vehicle 32a, 32b, 32n.

Detailed Description Text (7):
Depending on the make and model of the vehicle, the data packet can contain hundreds of datum that describe, e.g.: i) basic properties of the power train (e.g., emission levels, fuel-system status, engine temperature, speed and odometer readings, anti-lock brake status, RPMs, fuel and intake manifold pressure); and ii) manufacturer-specific information (e.g., status of the door locks, airbags, and entertainment center). In total, for most vehicles there are typically more than 300 datum that can be included in the data packet.

Detailed Description Text (8):
Certain vehicle functions can also be controlled by sending a data packet to the vehicle. Data in the data packet can adjust, for example, settings in the ECUs and OBD-II sensors, certain engine properties, and indicator lights on the vehicle's dashboard. They can also be used to open door locks and reconfigure the vehicle's entertainment system.

Detailed Description Text (9):
In addition, data packets routed through the wireless communications system 15 can be analyzed to determine the vehicle's approximate location. This can be done with relatively low accuracy (within a few miles) by simply recording the location of a specific cellular tower in the hardware component 17 of the wireless communications system 15 that routes the data packet to the host computer system 12. Recording the location of multiple base stations within range of the vehicle, and then analyzing these data using conventional algorithms (e.g., triangulation), increases the accuracy to which the vehicle's location is determined.

Detailed Description Text (10):
FIG. 2 shows a data collector/router 35 in electrical contact with a vehicle's OBD/ECU system 100. The two systems connect through a conventional OBD-II connector 120 typically located under the vehicle's dashboard. The data collector/router 35 is contained in a small, portable housing that plugs directly into the connector 120 and can be easily installed and replaced.

Detailed Description Text (11):
The connector 120 has a serial, 16-cavity layout, with specific electrical connections in separate cavities supplying data and electrical power from the OBD/ECU system 100. The connector electrically and mechanically matches an OBD-II interface 102 in the data collector/router 35. Although the OBD-II connector 120 has a standard mechanical interface, data transmitted through it may have a format and pass through cavities that depend on the vehicle's make and model. For example, Ford and General Motors vehicles use an OBD data format called J1850; data in this

format pass through cavities 2 and 10. Chrysler and most European and Asian manufacturers use a data format called ISO 9141-2 and pass data through cavities 7 and 15. In a third format, called J2284, data is passed through cavities 6 and 14.

Detailed Description Text (12):
The connector 120 also passes battery power (cavity 16), automobile chassis ground (cavity 4), and signal ground (cavity 5) from the OBD/ECU system 100 through the OBD-II interface 102 to the data collector/router 35. Using these connections, a power supply 105 receives the battery power, regulates it, and in turn drives a data processor 104 and wireless transmitter 106 within the data collector/router 35.

Detailed Description Text (13):
Once received, data is passed to the data processor 104 (e.g., a microprocessor) that processes and formats it to form a data packet. As an example, a data packet and specifically formatted for Bell South's wireless 900 MHz mobitex MPAK system is described in Table below. Actual data describing the host vehicle is contained in the 516-byte data area described in Table 1.

Detailed Description Text (14):
Once properly formatted as described in Table 1, the data packet is passed from the data processor 104 to the wireless transmitter 106. The transmitter 106 transmits the data packet through a conventional wireless antenna 108 over an airlink 38 to a wireless communications system (15) shown in FIG. 1. The data processor 104 formats the data packet according to the wireless communications system that transmits it.

Detailed Description Text (15):
Once transmitted, the data packet propagates through the wireless communication software and hardware components (17 and 19 in FIG. 1) of the communication network (e.g., the Mobitex network). Typically in this case the data packet is routed to a `point of presence` or `POP` in the network, where it is then transferred over a digital line (e.g., 40 in FIG. 1) to the host computer system.

Detailed Description Text (16):
The data area described in Table 1 contains data generated by the vehicle's OBD/ECU system 100. As described above, this system 100 functions effectively as an on-board computer network that generates, transmits, and receives data. For simplicity, the system 100 in FIG. 2 contains two OBD-II systems 121a, 121b and two ECU systems 125a, 125b; it is analogous to more complex OBD-II and ECU systems employed in actual vehicles. The OBD-II systems 121a, 121b are microcontrollers that monitor the various vehicle-related properties described above. The ECU systems 125a, 125b receive and send data to electromechanical actuators that control, e.g., fuel-injector pulses, spark-plug timing, and anti-lock braking systems.

Detailed Description Text (17):
The OBD-II systems 121a, 121b and ECU systems 125a, 125b are controlled by the vehicle's ECM/PCM 130. In some cases, the ECM/PCM 130 receives data from these systems and routes it over a shared electronic OBD buss 133. Alternatively, after receiving the data the ECM/PCM 130 converts it to "fail" or "malfunction" codes that are then routed over the shared electronic buss 133. In both cases, the OBD buss serially transmits data to the data collector/router 35 through the electrically connected OBD connector 120.

Detailed Description Text (19):
In the data-analysis method 150, the host computer system receives a data packet from the vehicle through the wireless communications network (step 152). The data packet has a format shown, e.g., in Table 1 above, and contains a wide range of information that characterizes the vehicle's performance. Once received, the packet is analyzed and an odometer reading (e.g., mileage) from the vehicle is extracted

(step 154). If necessary, the microprocessor then scales the odometer reading (e.g., converts kilometers to miles) or converts the format used in the data packet (e.g., a manufacturer-specific format) to one that is easily recognized by the end-user (step 156). At this point the odometer reading and other data within the data packet are distributed and stored in the data-memory module (e.g. a database) of the host computer system (step 158). Some data may be simply disregarded during this step. This portion (steps 152, 154, 156, and 158) of the method may be repeated at this point to generate additional data.

Detailed Description Text (20):
All the data (e.g. the vehicle's mileage collected at different time or mileage intervals) can be posted directly on a Web page on the Web server (step 162) where it is accessible by the end-user through the Internet. The data can also be analyzed further. For example, a current odometer reading can be compared to one recorded at an earlier date (step 160) to determine how many miles the vehicle has traveled since its last oil change. If this value exceeds that recommended for the particular vehicle, the host computer system can notify the user through electronic mail that the vehicle requires service (step 164). The method 150 can also be used to remotely adjust settings in the vehicle's OBD-II systems. For example, at this point the host computer system could send a data packet to the vehicle to reset the trip odometer to a new value (step 166).

Detailed Description Text (21):
FIG. 4 shows a sample Web page 200 from a Web server that displays data processed using a method similar to that shown in FIG. 3. Access to Web page is typically password-protected, thereby only allowing end-users with the correct password to access data for a particular vehicle.

Detailed Description Text (22):
The Web page 200 features a region 202 that describes the owner of the vehicle and its make and model. The page 200 also has a region 204 that describes the time, date, and odometer readings registered at its last update. Data describing vehicle problems (e.g., engine faults, coolant and brake fluid levels, emission status) that may require immediate attention are displayed in region 206. Data used to diagnose the overall condition of the vehicle (e.g., brake and transmission status, wheel alignment) are displayed in region 208. More data relating to these properties can be obtained by clicking the appropriate buttons ("Diagnostic Details", "Diagnostic Codes") in this region. The page 200 also includes a region 210 that provides the approximate location of the vehicle. As described above, the vehicle's location is determined by recording the location of one or more base stations used to send the latest data packet through the wireless communications system. The page also includes a region 212 that features data describing the general history and maintenance of the vehicle. A related region 214 describes parts for the particular vehicle that have been recently recalled. A region 216 describes the locations of parts dealers and local service stations for the particular vehicle, while the region 218 provides access to features that may affect travel, such as weather, traffic, road conditions, and the status of the vehicle's registration.

Detailed Description Text (23):
Other embodiments are within the scope of the invention. For example, the components used in the data collector/router (particularly the wireless transmitter) may be optimized for different types of wireless communications systems. These systems include wireless telephone and paging systems, Bluetooth.RTM., and similar systems. Similarly, the format of the data packet may also be adjusted for transmission over different types of networks. In general, any components in the data collector/router, and any format of the data packet, can be used to accomplish the general method of the invention.

Detailed Description Text (24):

Likewise, a wide range of mathematical algorithms can be used to analyze data once it is extracted from the data packets. These algorithms range from the relatively simple (e.g., lessors and renters determining the mileage on a vehicle for billing purposes) to the complex (e.g., predictive engine diagnoses using `data mining` techniques). Data analysis may be used to characterize an individual vehicle as described above, or a collection of vehicles. Algorithms used to characterize a collection of vehicles can be used, for example, for remote vehicle or parts surveys, to characterize emission performance in specific geographic locations, or to characterize traffic.

Detailed Description Text (25):
Other embodiments of the invention include algorithms for analyzing data to characterize vehicle accidents and driving patterns for insurance purposes; algorithms for determining driving patterns for use-based leasing; and algorithms for recording vehicle use and driving patterns for tax purposes. In general, any algorithm that processes data collected with the above-described method is within the scope of the invention.

Detailed Description Text (26):
Similarly, the temporal or mileage frequency at which data is collected can be adjusted to diagnose specific types of problems. For example, characterization of certain types of vehicle performance indicators, such as emissions, may need to be monitored relatively frequently. Other properties, such as mileage and fluid levels, may only need to be monitored every few days, or in some cases just a few times each year.

Detailed Description Text (27):
Once the data is analyzed, the Web page used to display the data can take many different forms. Different Web pages may be designed and accessed depending on the end-user. For example, individual users may have access to Web pages for their particular vehicle. Conversely, vehicle service providers (e.g. providers that change oil or certify a vehicle's emissions) may have access to Web pages that contain data (e.g., mileage and emissions data) from a wide range of vehicles. These data, for example, can be sorted and analyzed depending on vehicle make, model, and geographic location. Web pages may also be formatted using standard wireless access protocols (WAP) so that they can be accessed using wireless devices such as cellular telephones, personal digital assistants (PDAs), and related devices.

Detailed Description Text (28):
In other embodiments, additional hardware can be added to the in-vehicle unit. For example, hardware for global-positioning systems (GPS) may be added so that the location of the vehicle can be monitored along with its data.

Detailed Description Text (29):
In other embodiments, data from the data collector/router in the vehicle can be analyzed and used for: remote billing/payment of tolls; remote smog and emissions checks; remote payment of parking/valet services; remote control of the vehicle (e.g., in response to theft or traffic/registration violations); and general survey information.

CLAIMS:

1. A method for characterizing a vehicle's performance, comprising the steps of: retrieving data representative of the vehicle's performance through the vehicle's OBD or OBD-II connector according to a communication protocol at a predetermined time interval with a data collector/router comprising: i) an electrical connector that connects to the OBD or OBD-II connector; ii) a microprocessor configured to retrieve and transmit data at the predetermined time interval, and iii) a wireless transmitter in electrical contact with the microprocessor; wirelessly transmitting

the data with the wireless transmitter to a wireless communications system and then to a host computer; and analyzing the data with the host computer.

2. The method of claim 1, wherein the data is serially transferred through an OBD-II connector to the data collector/router.

3. The method of claim 2, wherein the protocol used to transfer data through the OBD-II connector is J1850, ISO 9141-2, J2284, or equivalents thereof.

5. The method of claim 4, wherein the generating step further comprises generating data that describes at least one of the vehicle's mileage, exhaust emissions, engine performance, engine temperature, coolant temperature, intake-manifold pressure, vehicle-identification number, engine-performance tuning parameters, alarm status, accelerometer status, fuel-injector performance, spark-plug timing, and a status of an anti-lock braking system.

6. The method of claim 1, wherein the analyzing step further comprises extracting data from the data packet corresponding to a specific property of the vehicle and storing the data in a computer memory or database.

8. The method of claim 7, wherein the processing further comprises analyzing the data with a mathematical algorithm to characterize or predict the electrical or mechanical performance of the vehicle.

9. The method of claim 7, wherein the processing further comprises comparing the data with data collected at an earlier time to characterize or predict the performance of the vehicle.

10. The method of claim 7, wherein the processing further comprises comparing the data with a predetermined numerical value or collection of values to characterize the performance of the vehicle.

11. The method of claim 7, wherein the data corresponds to a level of exhaust emissions for the vehicle, and the processing comprises comparing the level of exhaust emissions to a predetermined value for the particular vehicle to characterize the performance of the vehicle.

12. The method of claim 7, wherein the data corresponds to a mileage for the vehicle, and the processing comprises comparing the mileage to a predetermined value for the particular vehicle to characterize the performance of the vehicle.

13. The method of claim 1, further comprising sending an electronic text, data, or voice message to a computer, cellular telephone, or wireless device after the data is analyzed.

14. The method of claim 1, further comprising displaying results from the analysis on a computer, cellular telephone, or wireless device connected to the World-Wide Web or the Internet.

16. The method of claim 1, wherein the method further comprises the step of wirelessly sending a second data packet from the host computer system to the wireless communications system and then to the data collector/router disposed in the vehicle.

17. The method of claim 16, wherein the second data packet is processed by the microprocessor in the data collector/router to generate a signal, and the signal is sent to at least one microcontroller disposed within the vehicle.

19. A system for characterizing a vehicle's performance comprising: a data collector/router comprising: an electrical connector configured to connect to the

vehicle's OBD or OBD-II connector; a microprocessor in electrical contact with the electrical connector, the microprocessor configured to retrieve data generated by the vehicle at a predetermined time interval; and a wireless transmitter configured to receive the data from the microprocessor and wirelessly transmit it to a network; a first computer system comprising a processor configured to receive the data from the network; and a second computer system configured to analyze the data.

20. The system of claim 19, wherein the data collector/router is configured to serially transfer data through an OBD-II connector to the data collector/router.

22. The system of claim 19, wherein the processor in the host computer system is configured to analyze the data with a mathematical algorithm to predict or characterize the performance of the vehicle.

23. The system of claim 19, wherein the processor in the host computer system is configured to compare the data with other data from a data packet collected from the vehicle at an earlier time to characterize the performance of the vehicle.

24. The system of claim 19, wherein the processor in the host computer system is configured to compare the data with a predetermined numerical value or collection of values to characterize the performance of the vehicle.

25. The system of claim 19, wherein the data corresponds to a level of exhaust emissions for the vehicle, and the processor in the host computer system is configured to compare the level of exhaust emissions to a predetermined value for the particular vehicle to characterize the performance of the vehicle.

26. The system of claim 25, wherein the data is analyzed to infer the concentration of hydrocarbons, oxide of nitride, or carbon monoxide emitted from the vehicle.

27. The system of claim 19, wherein the data corresponds to a mileage for the vehicle, and the processor in the host computer system is configured to compare the mileage to a predetermined value for the particular vehicle to characterize the performance of the vehicle.

28. A system for characterizing a vehicle's performance comprising a data collector/router comprising: an electrical connector configured to connect through the vehicle's OBD or OBD-II connector; a microprocessor in electrical contact with the electrical connector, the microprocessor configured to retrieve data generated by the vehicle at a predetermined time interval; and a wireless transmitter configured to receive the data from the microprocessor and wirelessly transmit it to a network.

29. The system of claim 28, wherein the microprocessor is additionally configured to serially transfer data through the OBD, OBD-II or equivalent electrical connector.

31. A system for characterizing a vehicle's performance comprising a data collector/router comprising: an on-board diagnostic connector configured to connect to a serial connector located in the vehicle's interior; a microprocessor in electrical contact with the on-board diagnostic connector, the microprocessor configured to retrieve data generated by the vehicle at a predetermined time interval; a wireless transmitter integrated in the data collector/router configured to receive the data from the microprocessor and wirelessly transmit it to a network; and a housing containing the microprocessor and the wireless transmitter.

32. The system of claim 31, wherein the serial electronic connector is located underneath the vehicle's steering column.

35. A method for sending data to an electrical system in a vehicle, comprising the steps of: generating with a host computer data that affects at least one microcontroller disposed within the electrical system of the vehicle; wirelessly transmitting the data from the host computer to a wireless communications system and then to a data collector/router disposed in the vehicle, the data collector/router comprising: i) an electrical connector that connects to an OBD or OBD-II connector and comprises electrical connections for multiple vehicle models; ii) a microprocessor, and iii) a wireless transmitter in electrical contact with the microprocessor; receiving the data with the wireless transmitter; sending the data from the wireless transmitter to the microprocessor; processing the data with the microprocessor to generate processed data; and transmitting the processed data through the electrical connector to the microcontroller disposed within the vehicle's electrical system.

36. A method for characterizing a vehicle's performance, comprising the steps of: retrieving data representative of the vehicle's performance through an OBD or OBD-II connector at a predetermined time interval with a data collector/router comprising: i) an electrical connector that connects to the OBD or OBD-II connector and comprises electrical connections for multiple vehicle models; ii) a microprocessor, and iii) a wireless transmitter in electrical contact with the microprocessor; generating data representative of the vehicle's location with a global positioning system disposed within the vehicle; wirelessly transmitting a first set of data representative of the vehicle's performance with the wireless transmitter to a wireless communications system and then to a host computer; wirelessly transmitting a second set of data representative of the vehicle's location with the wireless transmitter to a wireless communications system and then to a host computer; analyzing the first and second sets of data with the host computer to generate analyzed data; and displaying the analyzed data on one or more web pages accessible on the internet.

Previous Doc Next Doc Go to Doc#